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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/539,831

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Partho Sarkar

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EXAMINER

ECHELMMEYER, ALIX ELIZABETH

ART UNIT

PAPER NUMBER

1729

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/539,831	<b>Applicant(s)</b> SARKAR ET AL.	
	<b>Examiner</b> Alix Elizabeth Echelmeyer	<b>Art Unit</b> 1729	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2-18,20,21,24-26,29,30 and 33-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 26,29,30 and 33-37 is/are allowed.
- 6) ☒ Claim(s) 2-18,20,21,24,25 and 38-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. This Office Action is in response to the amendment filed November 20, 2010. Claims 2, 5, 9, 13, and 18 are amended. Claims 22 and 43 are cancelled; claims 1, 19, 23, 27, 28, 31, and 32 were previously cancelled. Claims 6, 29, 30, and 33-37 were previously allowed.
2. The amendments overcome the rejection over Khandkar et al.; however, a new rejection is necessitated by the amendments.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
4. Claims 2, 5, 9, 10, 13, 14, and 38 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Shimozu (JP 02-075167) in view of Hsu (US 6,458,477).

Regarding claims 2, 5 Shimozu teaches a series of concentric solid oxide fuel cells, wherein the air and fuel paths are arranged between every other cell, such that the inner electrode of the inner fuel cell, the outer electrode of the middle fuel cell, and the inner electrode of the third fuel cell are cathodes.

Shimozu fails to teach that the electrolyte layer of at least one of the fuel cells has a different composition and different optimal operating temperature than another electrolyte layer in the stack.

Hsu teaches a fuel cell system wherein the system contains multiple temperature regions within the fuel cell stacks (column 8 lines 1-16). Hsu further teaches that the performance of the fuel cells within each temperature range can be maximized by using an electrolyte material, such as yttrium stabilized zirconia or doped cerium oxide, suitable for the optimal temperature of each region (column 8 lines 41-47).

Hsu and Shimozu are analogous because, though Hsu does not teach concentric cells as in Shimozu, both deal with solid oxide fuel cells arranged in a series. The skilled artisan will easily recognize that the inner fuel cell of Shimozu would operate at the highest temperature, since it is surrounded by fuel cells, which produce heat. The teachings of Hsu to select the electrolyte material in order to maximize the performance of the fuel cells within each temperature region apply to the fuel cell system of Shimozu since it would also be desirable to optimize the performance in the different temperature regions of the system of Shimozu.

Hsu further teaches that it is within the ordinary level of skill in the art to select a suitable electrolyte material for the desired operating temperature, since the skilled artisan would recognize which material is best suited for a given temperature range (column 5 lines 52-56).

It would have been obvious to the skilled artisan at the time the invention was made to select an electrolyte material for the fuel cells of Shimozu that would maximize the performance of a fuel cell based on the operating temperature of a fuel cell.

With regard to claims 9, 10, 13, 14, the skilled artisan would have been motivated to optimize fuel cell performance, as is discussed above, and it would be within the ordinary level of skill in the art to determine the best electrolyte for the application, such as having two stacks with the same electrolyte.

As for claim 38, again, the skilled artisan is capable of selecting the optimal material for a given temperature range and, depending on the temperature ranges of the concentric cells of Shimozu, the electrolyte materials of three cells may all be different.

5. Claims 3, 4, 6-8, 11, 12, 15-17, and 39-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimozu in view Hsu as applied to claims 2 and 5 above, and further in view of Cochran et al. (US 2004/0072054).

The teachings of Shimozu and Hsu as discussed above are incorporated herein.

Shimozu and Hsu teach that electrolyte material correlates to operating temperature. Hsu teaches electrolyte materials including yttrium stabilized zirconia and doped cerium oxide but fails to teach scandium stabilized zirconia, and gadolinium-doped cerium oxide.

Cochran et al. teach a solid oxide fuel cell having as electrolyte yttrium stabilized zirconia, scandium stabilized zirconia, and gadolinium-doped cerium oxide ([0045]).

One having ordinary skill in the art at the time the invention was made could have substituted one or all of the known solid electrolyte materials from Cochran et al. in the fuel cells of Shimozu and Hsu based on the properties of the materials and the results of the substitution would have been predictable. MPEP 2141 III

Furthermore, it has been held that selection of a known material based on its suitability for its intended use, such as its operating temperature, is obvious. MPEP 2144.07

Based on the teachings of Hsu, the ordinarily skilled artisan would be capable of determining the best combination of electrolyte materials of Hsu and Cochran et al. based on the operating temperature of the various fuel cells of Shimozu. The combinations of claims 3, 4, 6-8, 11, 12, 15-17, and 39-42 would have been obvious to the skilled artisan in light of Shimozu, Hsu, and Cochran et al.

6. Claims 18, 20-22, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimozu in view of Hsu, Hatano et al. (US 2002-0177026) and Du et al. (US 2004/0258972).

The teachings of Shimozu and Hsu as discussed above as discussed above are incorporated herein.

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Shimozu in view of Hsu teach the claimed solid electrolyte fuel cell system as discussed above with respect to claims 1 and 5.

Shimozu teaches a base board on which the concentric tubular fuel cells are arranged (abstract).

Shimozu fails to teach the material from which the base board is made.

Hatano et al. teach a metal foam base plate for use with solid oxide fuel cells ([0029]).

Hatano et al. further teach a nickel chrome metal backing sheet, which the skilled artisan would recognize to be oxidation resistant ([0057]).

Hatano et al. teach the electrode laminated to the base foamed-metal structure ([0029]).

The plate of Hatano et al. is desirable since it offers high gas-shielding and energy density at low manufacturing costs ([0006]).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the plate of Hatano et al. in the system of Shimozu in view of Hsu since the plate of Hatano et al. offers high gas-shielding and energy density at low manufacturing costs.

Shimozu in view of Hsu and Hatano et al. fail to teach that the solid oxide fuel cells are electrically interconnected to the support plate.

Du et al. teach a metal support plate for electrochemical cell stacks, wherein the stacks are electrically interconnected through the plate, which allows the stacks to be connected to a load ([0032], [0035]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to electrically connect the cells of Shimozu in view of Hsu to the porous metal foam matrix sheet of Hatano et al. such as suggested in Du et al. since such connection would allow for the cells to be connected to a load.

***Allowable Subject Matter***

7. Claims 26, 29, 30, and 33-37 are allowed.

8. The following is an examiner's statement of reasons for allowance: the prior art does not teach or fairly suggest the claimed subject matter. Applicant has argued convincingly in the Remarks filed January 4, 2010 that Browall et al. does not teach providing a plurality of combustible cores side-by-side. Furthermore, the examiner has not found any other art to support a rejection of this limitation. The examiner finds that the closest art, Sarkar et al. (US 7,452,622) does not qualify as prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."



***Response to Arguments***

9. Applicant's arguments filed November 10, 2010 have been considered but are moot in view of the new grounds of rejection, see above.

***Conclusion***

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is (571)272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ula Ruddock can be reached on 571-272-1481. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ula C Ruddock/  
Supervisory Patent Examiner  
Art Unit 1729

Alix Elizabeth Echelmeyer  
Examiner  
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aee